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21.1.96

Dear Gian Carlo,

I have now had time to return to your letter of 6th December and would like to offer the following comments.

There are two crucially distinct readings of OM–LOC:

(1) There is the reading which prohibits measurement procedures on the left from affecting measurement outcomes on the right. This is a case by case version of the probabilistic parameter independence, P.I.

This is the reading which is actually used in the derivation of

$$Q.M. \wedge Compl. \wedge (OM-LOC) \supset \neg (FAR-LOC) \qquad *$$

P.T.O.

and hence the denial of OM-Loc _in this sense_ can indeed block the derivation of $\neg$(ER-Loc) as we all agree.

(2) But there is a logically _stronger_ sense that prohibits not only setting-to-result effects at space-like separation, but also result-to-result effects (i.e. a case by case version of O.I.)

Now it is crucial for the logical structure of your argument that you use the logically weakest version of OM-Loc that is _necessary_ for the result ✗ to hold.

If you use a stronger version than is necessary, you _cannot_ infer that a failure of this _stronger_ version will block the derivation of $\neg$(ER-Loc). That is just a matter of straight logic.

Now in your discussion of the relation between OM-Loc and B-Loc, you are all

the time using the stronger version
of OM-LOC, since in your examples
you refer to the question of whether
the outcomes of the two measurements
influence one another.

Referring to my previous letter
dated 5th November, I was always
using the weak version of OM-LOC,
and for that version, I maintain
that my discussion of the
mathematics ~~~~~ of deriving

$$OM-LOC \supset B-LOC$$

was correct.

I would like now to deal with your
Example 3, in which you claim that
OM-LOC ⊃ P.I., requires a No Conspiracy
assumption.
If Alice selects by some rule when to toss, then she
is inducing a place-selection in the
random sequence generated by Bob. If
this altered the limiting frequency of Bob's
results, this would contradict the randomness

of Bob's sequence. But if Bob's sequence really _is_ random, this could not happen!

If you agree with the points in this letter, then I suggest the best way forward would be as follows: I enclose a copy of a _revised_ version of the paper with La Rivière, which I think summarizes my considered point of view on this vital question of a correct relativistic formulation of the EPR argument. I have been asked by Bob Cohen whether I would consider contributing this paper to the Shimony Festschrift he is editing. I would be happy to do this, and then you could raise additional points and comments in a further submission to Studies in History and Philosophy of Modern Physics. I would play no part in the editorial discussion of such a submission,

but would leave this for Jeremy to sort out with you.

I have very much enjoyed, and benifited from, our discussions of this matter.

With very best wishes

Michael

P.S. I should add in relation to your discussion of why the violation of OM-Loc is less serious than the violation of ER-loc from the relativistic point of view, that you again use the *strong* version of OM-Loc, when you talk, for example, of a "violation of OM-loc — due to a violation of O.I."